USER'S MANUAL

IDP2310UX

1600 x 1200 TFT LCD MONITOR

23.1" COLOR DISPLAY

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SAFETY INSTRUCTIONS

CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK,
DO NOT REMOVE COVER (OR BACK).
NO USER-SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

CAUTION: DOUBLE POLE / NEUTRAL FUSING.
DISCONNECT POWER BEFORE CHANGING FUSE.

Precautions

ON SAFETY

1. Before connecting the AC power cord to monitor, make sure the voltage designation of the monitor corresponds to the local electrical supply..
2. Never insert anything metallic into the cabinet openings of the monitor; doing so may create the danger of electric shock..
3. To avoid electric shock, never touch the inside of the monitor. Only a qualified technician should open the case of the monitor.
4. Never use your monitor if the power cord has been damaged. Do not allow anything to rest on the power cord, and keep the cord away from areas where people can trip over it.
5. Be sure to hold the plug, not the cord, when disconnecting the monitor from an electric socket.
6. Unplug your monitor when it is going to be left unused for an extended period of time.
7. Unplug your monitor from AC outlet before any service.
8. If your monitor does not operate normally - in particular, if there are any unusual sounds or smell coming from it – unplug it immediately an authorized dealer or service center.

ON INSTALLATION

1. Openings and fans in the monitor cabinet are provided for ventilation. To prevent overheating, these openings and fans should not be blocked or covered. Also avoid using the monitor on a bed, sofa rug, or other soft surface, doing so may block the ventilation openings and fans in the monitor cabinet. If you put the monitor in the enclosed space, be sure to provide adequate ventilation.
2. Put your monitor in a location with low humidity and minimum of dust.
3. Do not expose the monitor to rain or use it near water. If the monitor, accidentally, get wet, unplug it and contact an authorized dealer immediately. You can clean the monitor with damp cloth if necessary, but be sure to unplug the monitor first.
4. Place your monitor on a solid surface and treat it carefully.
5. Locate your monitor near an easily accessible AC outlet.
6. High temperature can cause problems. Do not use your monitor in direct sunlight and keep it away from heater, stoves and other sources of heat.

ON CLEANING

The screen is made of thin glass with a plastic surface and can be damaged if dropped, hit and scratched.

Do not clean the front panel with keton-type materials(e.g., acetone), ethyl alcohol, toluene, ethyl acid, methyl or chloride – these may damage the panel.

ON REPACKING

Do not throw away the carton and packing materials. They make an ideal container which to transfer the unit. If you have any questions about this unit, contact your authorized dealer.

ON DISPOSAL

This unit contains which can pollute the environment if disposed carelessly. Please contact our nearest representative office or your local environmental office in case of disposal of this unit.

ON VESA MOUNTING

- Make sure to unplug before installing this product. Otherwise, it may cause a fire or could give an electric shock.
- Do not install this product by yourself. Contact the qualified service technician. Otherwise, it may cause injuries.
- Do not install this product on the place where it cannot be supported. Otherwise, it may cause the product to fall and could cause injuries.
- Contact the qualified service technician for moving or replacing this product after installing. Installing the product needs specified technique, so it may cause safety problem to move or install it by yourself.
- Do not hang on or impact on this product. Otherwise, it may cause the product to fall and could cause injuries.
- Do not install this product by alone. Get some help from others. Otherwise, it may cause the product to fall and could cause injuries.
- Do not place a heat source or a humidifier under the installed product. Otherwise, it may cause a fire or could give an electric shock.
- Do not install this product near a high voltage electric line, any power source or the place where impact or vibration can affect.
- Do not install this product barehanded. Otherwise, it may cause injuries.
- The screw is not provided to user as default. Use the screw, which can stand the weight of this product. And, we recommend the machine screw BH(+)M4 x 14mm to 18mm as type.

FCC INFORMATION

USER INSTRUCTIONS

The Federal Communications Commission Radio Frequency Interference Statement includes the following warning:

NOTE This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

USER INFROMATION

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

If necessary, consult your dealer or an experienced radio/television technician for additional suggestions. You may find the booklet called How to identify and Resolve Radio/TV Interference Problems helpful. This booklet was prepared by the Federal Communications Commission. It is available from the U.S. Government Printing Office, Washington, DC 20402, Stock Number 004-000-00345-4.

WARNING User must shielded signal interface cables to maintain FCC compliance for the product.

DECLARATION OF CONFORMITY FOR PRODUCTS MARKED WITH FCC LOGO

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
This party responsible for product compliance:

Provided with this monitor is a detachable power supply cord with IEC320 style terminations. It may be suitable for connection to any UL Listed personal computer with termination. Before making the connection, make sure the voltage rating of the computer convenience outlet is the same as the monitor and that the ampere rating of computer convenience outlet is equal to or exceeds the monitor voltage rating.
For 120 Volt applications, use only UL Listed detachable power cord with NEMA configuration 5-15P type (parallel blades) plug cap. For 240 Volt applications use only UL Listed detachable power supply cord with NEMA configuration 6-15P type (tandem blades) plug cap.

VCCI

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BRIEF DESCRIPTION

GENERAL

This specification defines the requirements for the IDP2310UX, 23.1" COLOR DISPLAY TFT LCD monitor with 1600 X 1200 pixels visible resolution, which is designed and tailored for use in operator display systems such as ECDIS monitor applications.

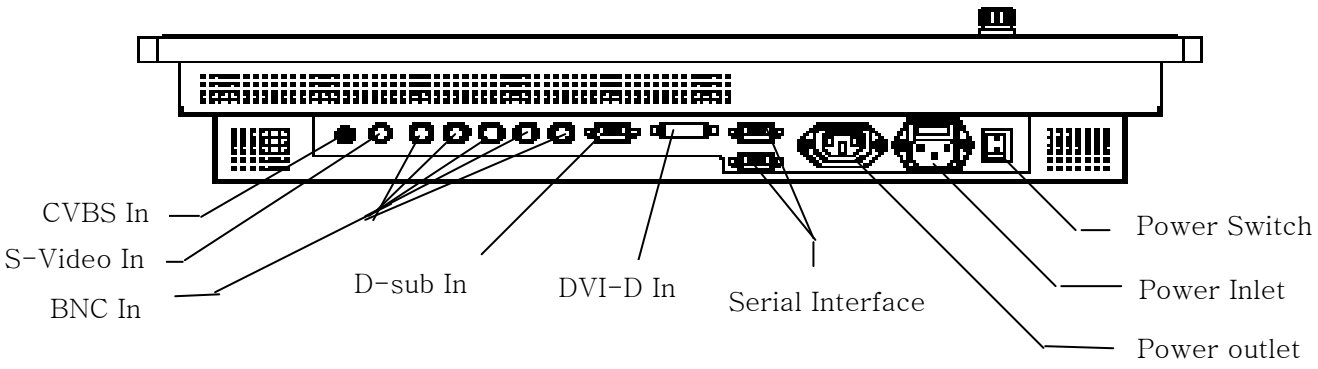
The IDP2310UX has a 23.1" diagonal viewable display area and 1600 x 1200 pixels addressable resolution. The (0.098 X RGB) X 0.294 mm dot pitch LCD provides the most accurate and crisp images on the screen for mission critical applications.

The IDP2310UX provides 16.7 million true colors (8-bit) per pixel. Each pixel is divided into Red, Green and Blue sub pixels which are arranged in vertical stripes and each sub-pixel is controlled in 256 grey levels.

KEY FEATURES

- Color display 23.1" TFT LCD Monitor
- Full 1600 x 1200 resolution
- Two Analog (BNC and D-sub) input, single DVI input, CVBS and S-Video.
- RS-422, RS-485 and RS-232 Communication
- Versatile mechanical version : Rack mount, Desktop Type and VESA Mount Type(if it needs, firstly contact for us)
- Free Voltage AC power : 100 – 264Vac , 47 ~63Hz, 1.0A at 230Vac

INPUT DIAGRAM



- BNC and D-sub input connectable to any source compatible to general CRT monitor
- Digital input fully compatible to DVI-D Standard of VESA DDWG
- Chain of Power just one level through power output totally

1. TECHNICAL SPECIFICATIONS

1.1 ELECTRO-OPTICAL SPECIFICATIONS

1.1.1 Screen Specifications

1.1.1.1 Panel Technologies
- AMLCD (Active Matrix Liquid Crystal Display) technology
- Amorphous silicon TFT (Thin Film Transistor) technology

1.1.1.2 Screen Dimensions
- Aspect ratio 4:3
- Active screen size:
  - 470.4 (H) x352.8 (V) mm (18.52” x 13.89”)
  - 588.0 mm (23.1”) diagonal

1.1.1.3 Display colors
- 16,777,216 true colors (8-bit), 256 grey scales

1.1.1.4 Resolution
- 1600 (H) x 1200 (V) pixels
- Pixel arrangement: RGB (Red dot, Green dot, Blue dot) Vertical Stripe
- Pixel pitch: 0.294 (W) x 0.294 (H) mm

1.1.1.5 Display mode
- Normally Black

1.1.2 Optical Characteristics

1.1.2.1 Protective Filter Glass
- Clear, tempered glass
- Anti Reflective Film and Anti-Static Treatment

1.1.2.2 Luminance (Brightness)
- 250 cd/m² (max. typical on LCD)
- 240 cd/m² (max. typical on Protective Filter Glass)
- Dimming Ratio: 1000 to 1
- White uniformity: 75% max..

1.1.2.3 Contrast ratio
- 500 : 1 (typical on LCD)

1.1.2.4 Viewing Angle: At the contrast ratio > 10:1
- Horizontal: +/- 85° (typical)
- Vertical: +/- 85° (typical)

1.1.2.5 Response time @ 25°C ambient
- Tr (White → Black): 10 ms (typical)
- Td (Black → White): 20 ms (typical)

1.1.3 Input Signal Specifications

- IDP2310UX provides maximum five (5) input signal interfaces, 2 x Analog (BNC,D-sub) Input ,1x Digital Input, 1xCVBS input and 1xS-video.
- Standard input resolution is UXGA (1600 x 1200 pixels)
- Other resolutions are supported as specified below. No scaling is provided for input signals with resolutions less than the standard input resolution 1600x 1200 pixels.

Resolution		Hsync (KHz)	Vsync (Hz)
VGA	640 x 480	31.0 - 43.0	60.0 - 85.0
SVGA	800 x 600	35.0 - 53.7	56.0 - 85.0
XGA	1024 x 768	48.4 - 68.3	60.0 - 85.0
SXGA	1280 x 1024	64.0 – 91.2	60.0 - 85.0
UXGA(analog)	1600 x 1200	75.0 – 93.8	60.0 - 75.0
UXGA(digital)	1600 x 1200	75	60.0

- Specified support resolutions

Resolution	H-Frequency (kHz)/(polarity)	V-Frequency(Hz)/(polarity)
1600x1200(digital)	75(+)	60(+)
1600x1200(analog)	93.75(+)	75(+)
	87.5(+)	70(+)
	81.25(+)	65(+)
	75(+)	60(+)
1280x1024	91.146(+)	85(+)
	79.976(+)	75(+)
	63.981(+)	60(+)
1024x768	68.667(+)	85(+)
	60.023(+)	75(+)
	56.476(-)	70(-)
	48.363(-)	60(-)
800x600	53.674(+)	85(+)
	46.875(+)	75(+)
	48.1(+)	72(+)
	37.879(+)	60(+)
	35.1(+)	56(+)
640x480	43.269(-)	85(-)
	37.5(-)	75(-)
	37.7(-)	72(-)
	31.469(-)	60(-)
720x400	31.469(-)	70(+)

1.1.3.1 Analog Input

- Analog RGB input signal shall be as follows:
  - Video Signal Level: 0.714 Vp-p nominal
  - Video Signal Polarity: Positive (Black to White). Polarity is detected automatically. Both 0 V to +0.714 Vp-p and -0.714 V to 0 Vp-p is allowed.
  - Video Input Impedance: 75 Ohm terminated (RGB Video Signal)
  - Sync: TTL voltage levels, External Separate H & V Sync.
  - Interlace: Non-interlaced

1.1.3.2 Input Selection

In case multiple input source is connected, input to be displayed can be selected by:

- Manual: Operator can select the input manually using control panel.

1.1.4 Controls of the Display

1.1.4.1 Remote Control via serial ports (JH Communication compatible)

- There are serial ports on the back side of the IDP2310UX for remote control of the monitor by customer application.
  - RS-422 port: Sub D, 15p, Female (for JH protocol)
  - RS-232/485 port: Sub D, 9p, Female (for JH protocol)
  - RS-485 port: Sub D, 9p, male as output (for Inter-Monitor Communication)

1.1.4.2 Control via OSD

- Control block with the push buttons is available: Menu, Select, ◄ and ►. Settings are selected by the Menu that guides you through the OSD menu.
- Control block also has Volume for dimming brightness.
- Control block also has LED indicators, refer to 1.1.5.

1.1.5 LED Indicator

- Fault information in available by LED indicators
- Normal : Green indicator
- Soft Power Off: Amber indicator
- No signal : Amber Blinking (every 1 second) indicator
- System Fault : Red indicator

1.1.6 Power Supply Specification

1.1.6.1 Voltage range

- Standard :100 –264Vac, 47~63Hz,1.0A at 230Vac

1.1.6.2 Power consumption

	Normal	Max. (100% Light output)
IDP2310UX	80 W	90W

1.1.6.3 Power variation protection

- Unit will not be damaged when Voltage transients remain within value as defined in the applicable voltage range

1.1.6.4 Over-temperature protection

- When the internal temperature gets above than the warning level (65℃), the light output of the backlight is half. And, LED as red color
- When the internal temperature reaches above the critical Value (80℃), the light output of the backlight is turned off. And, LED as red color
- When the internal temperature gets below than the safe level (64℃), the light output of the backlight is restored. And, LED recovers to green.

1.1.7 Connectors

1.1.7.1 Power connectors

- Standard: IEC type connector

1.1.7.2 Input signal connectors

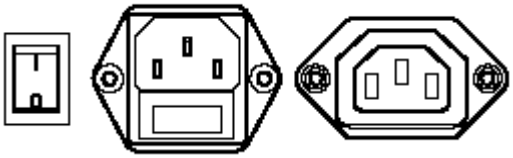
- Analog Input: 5 Coaxial BNC connectors for R, G, B, HS and VS
- Digital input: DVI-D connectors
- CVBS input: RCA connectors
- S-video input: 4pin mini DIN connectors

1.1.7.3 Interface connectors for remote control

- RS-422 port: Sub D, 9p, Female (for JH protocol)
- RS-232 or RS-485 port: Sub D, 9p, Female (for JH protocol)
- RS-485 port: Sub D, 9p, male (for Inter-Monitor communication)

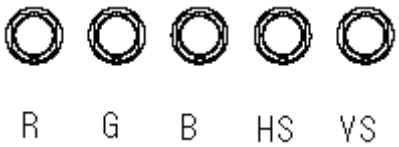
1.1.8 Connection & PIN Assignment

Power Input / output



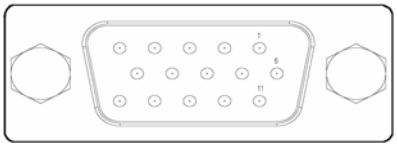
- 90-264Vac, 47~63Hz with double pole / neutral fusing, 250V F3.15AL
- Disconnect power before changing fuse
- Chain thru power output to limit to one level totally

Analog Input (BNC)



- R : Analog Red Signal Input (0.7 Vpp, 75 ohm)
- G : Analog Green Signal Input (0.7 Vpp, 75 ohm)
- B : Analog Blue Signal Input (0.7 Vpp, 75 ohm)
- HS : Horizontal Sync Signal Input (TTL)
- VS : Vertical Sync Signal Input (TTL)
- Connection Type : 5 x BNC

Analog Input (D-Sub)



- Connection Type : 15p D-aub Female (Analog only support)

1. Red
2. Green
3. Blue
4. Ground
5. DDC Ground
6. Red Ground
7. Green Ground
8. Blue Ground
9. back up
10. sync Ground
11. Ground
12. DDC Data
13. H sync
14. V sync
15. DDC Clock

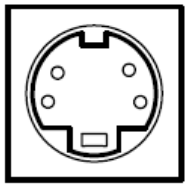
Digital Input

- Connection Type : 29p DVI-I Female (Digital only support)

1. TMDS Data 2-
2. TMDS Data 2+
3. TMDS Data 2/4 Shield
4. TMDS Data 4-
5. TMDS Data 4+
6. DDC Clock
7. DDC Data
8. No Connection
9. TMDS Data 1-
10. TMDS Data 1+
11. TMDS Data1/3 Shield
12. TMDS Data 3-
13. TMDS Data 3+
14. +5V power
15. Ground (Return for +5V)
16. Hot Plug Detection
17. TMDS Data 0-
18. TMDS Data 0+
19. TMDS Data 0/5 Shield
20. TMDS Data 5-
21. TMDS Data 5+
22. TMDS Clock Shield
23. TMDS Clock+
24. TMDS Clock-

C1 ~ C5 : No Connection

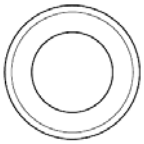
S-Video



- Connection Type : 4-pin DIN Jack

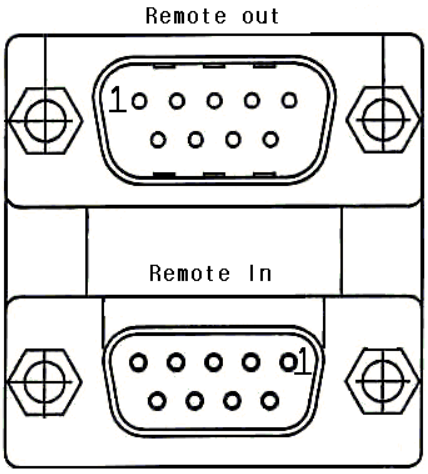
1. GND
2. LUMA
3. CROMA
4. GND

CVBS



- Connection Type : RCA Jack

Serial Interface



- Remote In(female)

1. No connection
2. RxD (for RS-232)
3. TxD (for RS-232)
4. TxIN_B (for RS-485)
5. RxIN_B (for RS-485)
6. No connection
7. Ground
8. TxIN_A (for RS-485)
9. RxIN_A (for RS-485)

- Remote out(male)

1. No connection
2. No connection
3. No connection
4. TxOUT_B (for RS-485)
5. RxOUT_B (for RS-485)
6. No connection
7. Ground
8. TxOUT_A (for RS-485)
9. RxOUT_A (for RS-485)

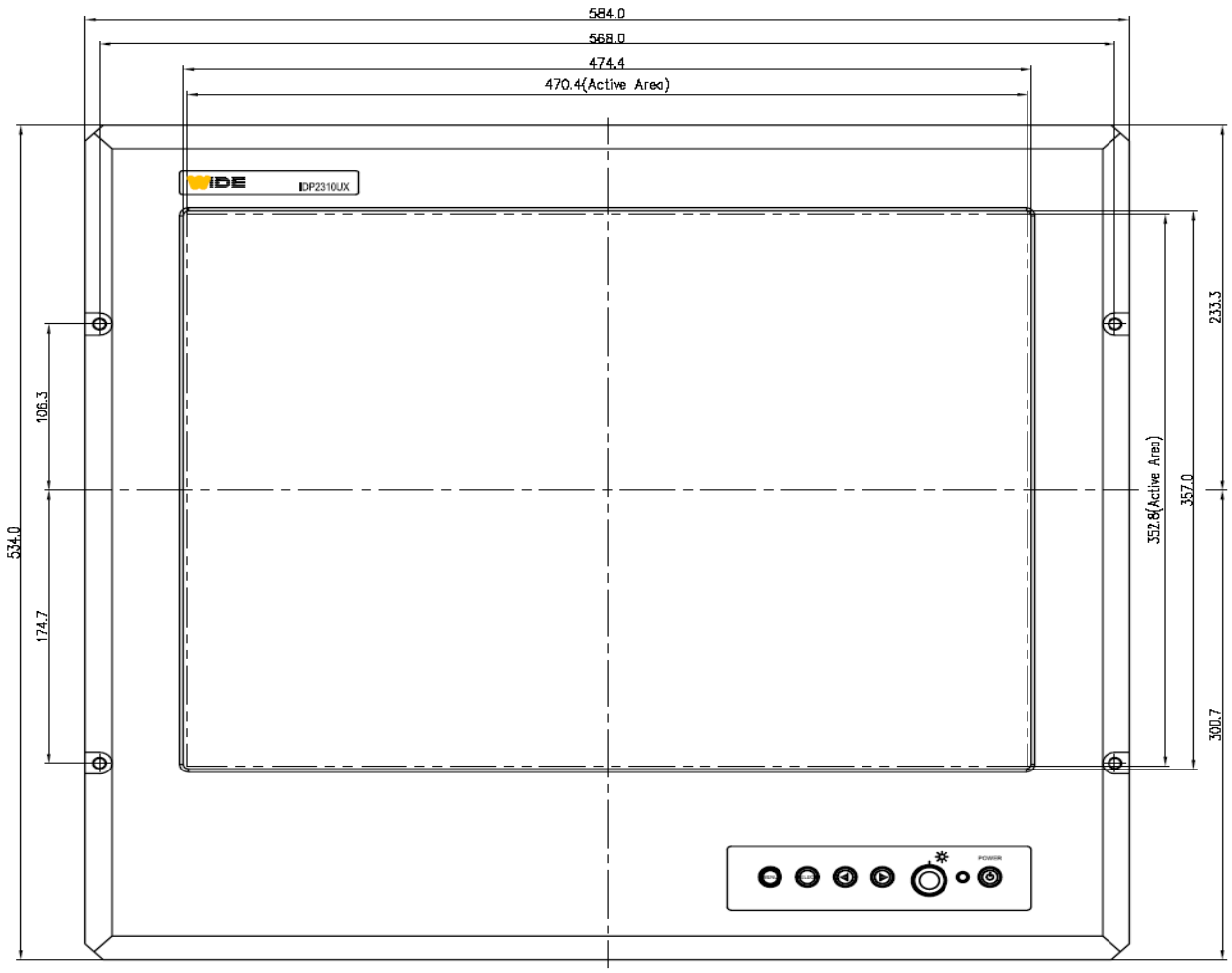
1.2 MECHANICAL SPECIFICATIONS

1.2.1 Dimension and Weight (Rack Mount)

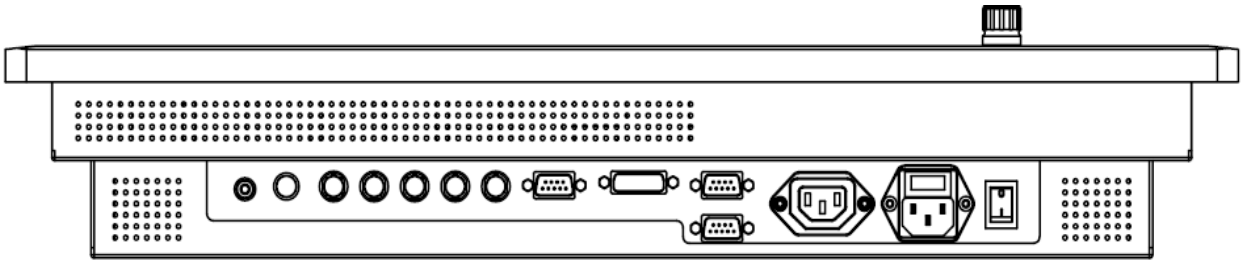
The dimension of the unit is as shown in the table below:

	Monitor only	Packing
Height (mm / inch)	534 / 21.02	780/ 30.71
Width (mm / inch)	584 / 22.99	790/ 31.10
Depth (mm / inch)	93.8 / 3.69	297.5/ 11.72
Weight (kg / lbs)	15.5 / 34.2	20.5 / 45.2

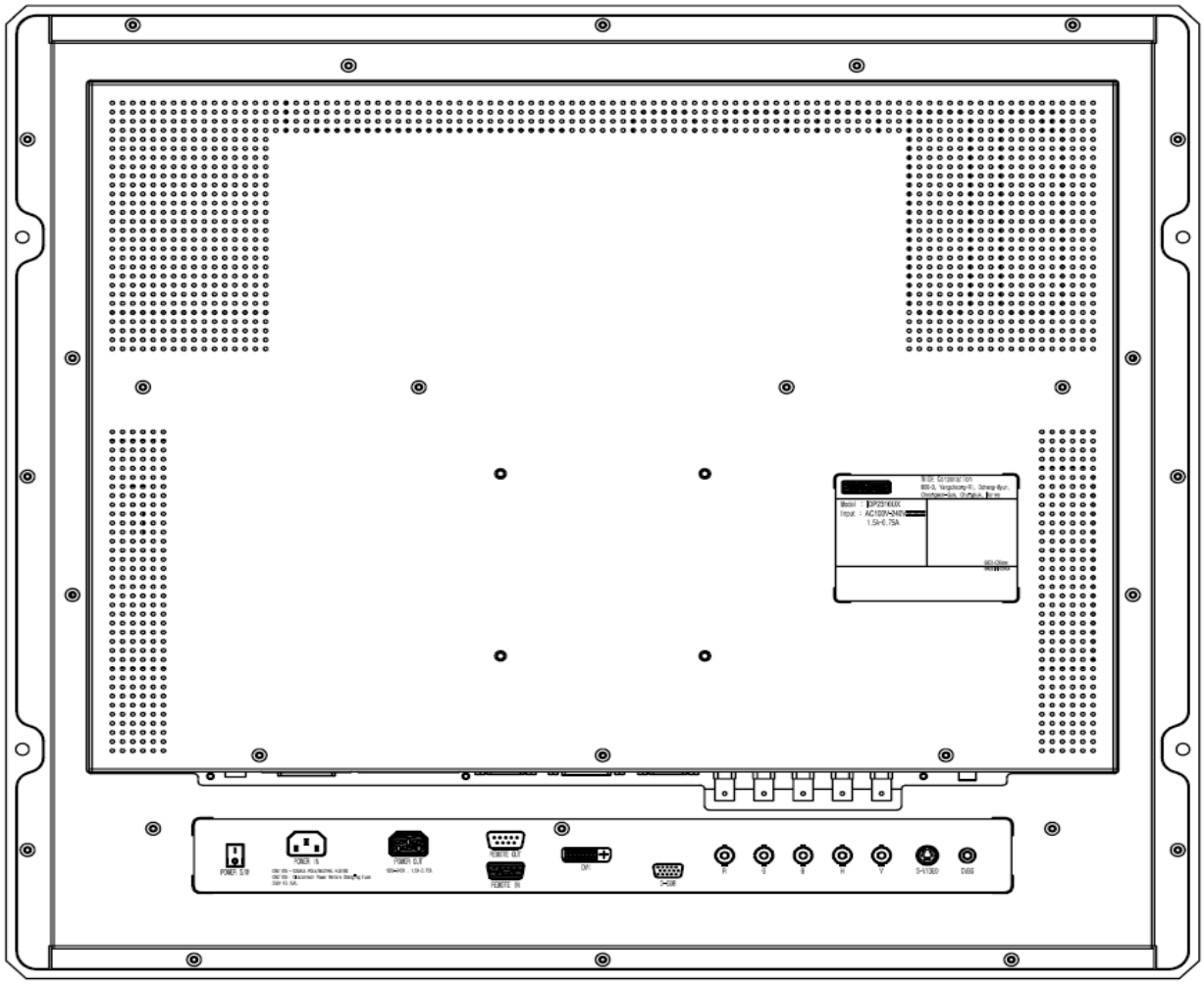
The following figures show a Rack Mount version mechanical dimension. IDP2310UX basically provides three input connectors and all connectors are located the bottom side of monitor.



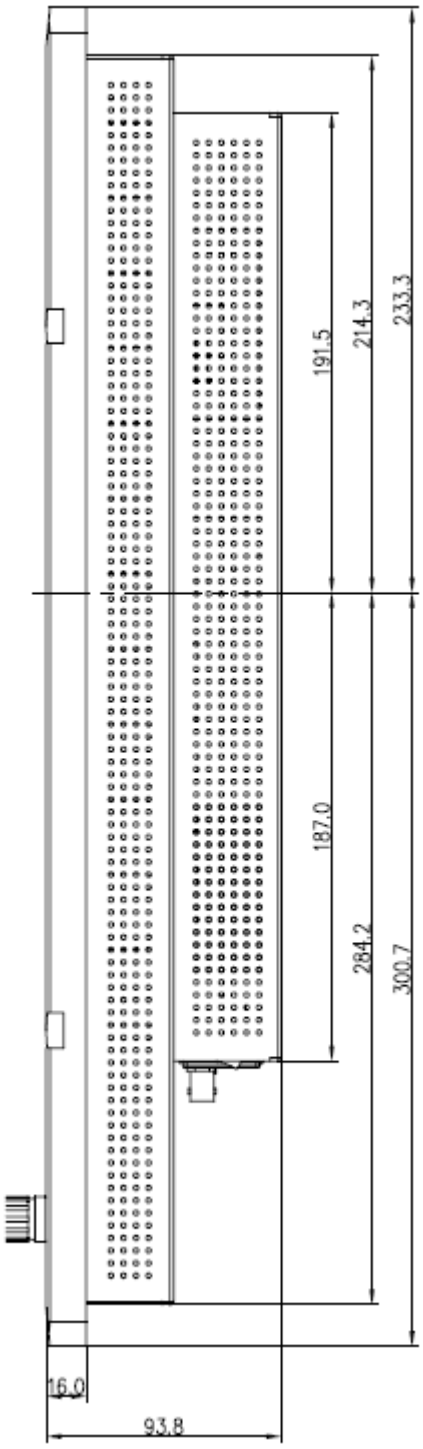
< IDP2310UX Front View : unit mm >



< IDP2310UX Bottom View >



< IDP2310UX Rear View >



< IDP2310UX Side View : unit mm>

1.2.2 Mounting

The weight for the unit shall not exceed 15.5 kg (34.2 lbs)

- Fixing: using 4 captive M6 bolts in front bezel
- IDP2310UX can be Standard rack mounted with an optional adapter plate

1.2.3 Finishing

- Standard Bezel color is Black (Rack Mount Type)
- Other bezel colors can be made available on request

1.2.4 Screws/Bolts

- Number of screws to use for maintenance: reduced to minimum
- Type of screws requires maximum 3 standard tools

1.2.5 Components

Industrial extended temperature range components are used for cost, maintainability and reproducibility purposes.

1.2.6 Cooling

The Unit does not need any forced air-cooling

1.3 ENVIRONMENTAL SPECIFICATIONS

The unit is designed to meet the following environmental standards:

1.3.1 Temperature

- Operating : -15°C ~ + 55°C (+5°F ~ +131°F)
- Storage : - 40°C ~ + 70°C (-40°F ~ + 158°F)
- IEC60945

Note: The unit may show limited performance in case of continuous operation at low temperature due to the increased response time and reduced brightness, and may not confirm to the requirements of this specification.

1.3.2 Humidity

- Operating: 10% - 90%
- Storage: 5% - 95%
- IEC60945

1.3.3 Vibration

- 1.03 Grms for 5 ~ 200Hz Random Vibration
- 1 hour (Z : 30 min, X,Y : 15 min, respectively)
- Chassis Type with packing in carton box
- IEC60945

1.3.4 Altitude

- Non-operating : Up to 30,000 ft
- Operating : Up to 10,000 ft

1.3.5 EMC

- FCC Part 15 subpart B, Class A
- CE(EMC)
  -EN55022(EMI)
  -EN55024(EMS)
- MIC
- VCCI Class A
- IEC60945

1.3.6 Safety

- CE & CB
  EN60950-1

- UL / cUL
  UL60950-1

1.3.7 Certificate for ECDIS

- EN61174(IEC61174)

1.3.8 Drip-proof

- Front side is drip-proof. Test shall be done when the unit is mounted in a console.
  Front bezel: IP64

NOTE: The unit is type approved according to EN60945(2002),4.4, equipment category b)Protected from the weather (formerly class B)

1.4 OHTER SPECIFICATIONS

1.4.1 Reliability

MTBF (Mean Time Between Failures)

- Standard calculated MTBF : 40,986h (MIL-HDBK-217F)
- Ship calculated MTBF : 19,468h (MIL-HDBK-217F)

1.4.2 Maintainability

MTTR (Mean Time Between Repair)

- IDP2310UX is defined as a Line Replaceable Unit (LRU) and the unit is designed to allow for an MTTR less than 0.5 hour (30 minutes).

- Use of maintenance equipment
  A modular design is taken for the unit. No special tools or equipment are required for maintenance purpose.

1.4.3 Use of toxic materials

Cold Cathode Fluorescent Lamp (CCFL) in the backlight assemblies contains a small amount of mercury. The backlight assembly is placed inside of the monitor and is not exposed to user.

1.4.4 Packing

The unit shall be packaged for international transport by air freight in accordance with best practices for insuring arrival at customer site in an undamaged condition.

1.4.5 Buzzer Option.

2. Communication

2.1 Protocol

2.1.1 ASCII Characters Table

All communications are based on ASCII Code.

ASCII Code	Char.	ASCII Code	Char.	ASCII Code	Char.	ASCII Code	Char.
0x00	NULL	0x20	SP	0x40	@	0x60	`
0x01	SOH	0x21	!	0x41	A	0x61	a
0x02	STX	0x22	"	0x42	B	0x62	b
0x03	ETX	0x23	#	0x43	C	0x63	c
0x04	EOT	0x24	$	0x44	D	0x64	d
0x05	ENQ	0x25	%	0x45	E	0x65	e
0x06	ACK	0x26	&	0x46	F	0x66	f
0x07	BELL	0x27	'	0x47	G	0x67	g
0x08	BS	0x28	(	0x48	H	0x68	h
0x09	HT	0x29	)	0x49	I	0x69	i
0x0a	LF	0x2a	*	0x4a	J	0x6a	j
0x0b	VT	0x2b	+	0x4b	K	0x6b	k
0x0c	FF	0x2c	,	0x4c	L	0x6c	l
0x0d	CR	0x2d	-	0x4d	M	0x6d	m
0x0e	SO	0x2e	.	0x4e	N	0x6e	n
0x0f	SI	0x2f	/	0x4f	O	0x6f	o
0x10	DLE	0x30	0	0x50	P	0x70	p
0x11	DC1	0x31	1	0x51	Q	0x71	q
0x12	DC2	0x32	2	0x52	R	0x72	r
0x13	DC3	0x33	3	0x53	S	0x73	s
0x14	DC4	0x34	4	0x54	T	0x74	t
0x15	NAK	0x35	5	0x55	U	0x75	u
0x16	SYN	0x36	6	0x56	V	0x76	v
0x17	ETB	0x37	7	0x57	W	0x77	w
0x18	CAN	0x38	8	0x58	X	0x78	x
0x19	EM	0x39	9	0x59	Y	0x79	y
0x1a	SUB	0x3a	:	0x5a	Z	0x7a	z
0x1b	ESC	0x3b	;	0x5b	[	0x7b	{
0x1c	FS	0x3c	<	0x5c	\	0x7c	|
0x1d	GS	0x3d	=	0x5d	]	0x7d	}
0x1e	RS	0x3e	>	0x5e	^	0x7e	~
0x1f	US	0x3f	?	0x5f	_	0x7f	DEL

– End of ASCII Characters Table –

2.2.2 Communication Data Format

Byte#	0	1	2,3,4	5	6	7,ect	7+LEN
	ATTN	ADDR	CMD	LEN	IHCHK	DATA	IDCHK

Attention (ATTN)

This byte is used to identify a start of message. It can be one of 3 values:

ATTN	Description
0x07	Command (ASCII BELL)
0x06	Acknowledge (ASCII ACK)
0x15	Negative Acknowledge (ASCII NAK)

A device shall send a command using the 0x07 Attention Code. The display will respond to the Command with either an ACK if the command completed successfully, or a NAK if the command failed.

Address (ADDR)

This byte is used to specify a particular display to receive a command and to identify the display responding (ACK or NAK) to a command. All displays will support the broadcast address.
The display will meet all functional requirements without individual Display addressing

The Address field shall have the following values:

ADDR	Description
0xFF	Broadcast – Addressed to all display
0x00 to 0x0f	Address of a specific display (max of 16 Display)

Command (CMD)

The command shall be one of the following values:

CMD 0	CMD1	CMD2	ASCII	Description
0x42	0x52	0x54	“BRT”	Brightness Command
0x4D	0x41	0x4E	“MAN”	Manufacturer ID Code
0x4D	0x43	0x43	“MCC”	Display Control Command
0x54	0x59	0x50	“TYP”	Type/Model Number Command

Brightness Command “BRT”

This command shall be sent to the display to command the backlight brightness control setting.
The brightness value shall be sent as 1 byte in the DATA field. A setting of 0x00 will indicate off.
A setting of 0xFF will indicate maximum brightness. Intermediate values will control brightness over the range from minimum to maximum luminance.

If the data checksum is valid and the brightness was set, the display will reply to this command with an ACK attention code. The DATA field in the reply will indicate the resulting brightness control setting.
If an invalid checksum was received and the message was not Broadcast and RS485, the display will reply with an NAK attention code. The DATA field in the reply will indicate the current brightness control setting.

Manufacturer ID “MAN”

This command shall be sent to the display to request Manufacturer ID Code. No data shall be sent with this command.
The display will reply to this command with an ACK attention code. The DATA field will be set to an ASCII string value that is unique for each manufacturer.

2.2.3 Commadns Table

function	Command	Description	Acknowledge (if enabled)
Brightness control	0x81, nn I “+” I ”-“ I “r” I “R” I “?”	Set brightness = Value / increment / decrement Reset Query	Brightness.

Contrast control- all channels	0x82, ”a” l “A”, nn l “+” l “-“ l “r” l “R” “?”	Set all contrast = Value / increment / decrement Reset Query	Contrast
Color temperature select	0xb3, n l “r” l “R” l “?”	Select color temperature = Value Reset Query	Main selected “0”－9200K. “1”－6400K. “2”－5600K.
Red level for selected Color temperature	0xb4, nn l ”+” l “-“ l “r” l “R” l “?”	Set the level of the red channel for the selected color temp. = Value / increment / decrement Reset Query	Red level for selected color temperature
Green level for selected Color temperature	0xb5, nn l ”+” l “-“ l “r” l “R” l “?”	Set the level of the green channel for the selected color temp. = Value / increment / decrement Reset Query	Green level for selected color temperature
bule level for selected Color temperature	0xb6, nn l ”+” l “-“ l “r” l “R” l “?”	Set the level of the Bule channel for the selected color temp. = Value / increment / decrement Reset Query	Bule level for selected color temperature
Clock (frequency) (Analog , bnc only)	0x8b nnn l “+” l “-“ l “r” l “R” l “?”	Set H active size = Value / increment / decrement Reset Query	Graphic mode H active size (in pixels)
Phase (Analog , bnc only)	0x85 nnn l “+” l “-“ l “r” l “R” l “?”	Set dot clock phase = Value / increment / decrement Reset Query	dot clock phase
OSD status enquiry	0xbb	Status of OSD	“0”－OSD turned off “1”－OSD turned off
H position	0x86, nnn l “+” l “-“ l “r” l “R” l “?”	Set H position Value / increment / decrement Reset Query	Horizontal position

V position	0x87, nnn I “+” I “-“ I “r” I “R” I “?”	Set H position Value / increment / decrement Reset Query	vertical position
PIP window size Select	0xa6, n I “r” I “R” I “?”	Select PIP window size = PIP window size value Reset Query	PIP window size selected “0” – small size “1” – large size
PIP source select	0xa7, n I “r” I “R” I “?”	Select input main = Video source value Reset Query	Main selected. “0” – CVBS “1” – S-video
PIP Location	0xa4, n I “r” I “R” I “?”	Select location = PIP location value Reset Query	Select ed PIP location “0” – left top “1” – right top “2” – right bottom “3” – left bottom
PIP ON / OFF	0xa5, n I “r” I “R” I “?”	Select PIP ON /OFF = PIP ON / OFF value Reset Query	Select ed PIP location “0” – PIP turned off “1” – PIP turned on
Video brightness control (CVBS,S-video only)	0x84, nn I “+” I “-“ I “r” I “R” I “?”	Set video brightness = Value / increment / decrement Reset Query	video brightness
Video contrast control (CVBS,S-video only)	0x83, nn I “+” I “-“ I “r” I “R” I “?”	Set video contrast = Value / increment / decrement Reset Query	video contrast
Graphic mode sharpness (Analog, BNC only)	0x89, nnn I “+” I “-“ I “r” I “R” I “?”	Set graphic mode sharpness = Value / increment / decrement Reset Query	Graphic mode sharpness
Video sharpness (CVBS,S-video only)	0x8a, nnn I “+” I “-“ I “r” I “R” I “?”	Set video mode sharpness = Value / increment / decrement Reset Query	video mode sharpness
Select OSD language	0x95, n I “r” I “R” I	Select language = English, Korea Reset	“0” – English “1” – Korea

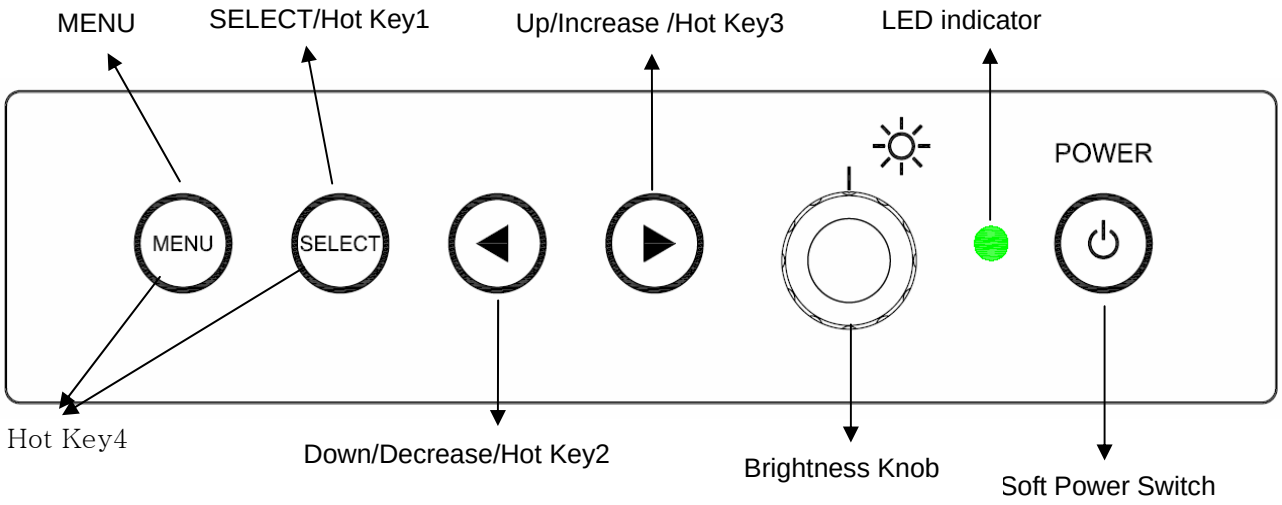
	“?”	Query	
Input main select	0x98, n I “+” I “-“ I “r” I “R” I “?”	Select input main = PC or VIDEO or next available Reset Query	Main selected “0” – Analog RGB(PC) “1” – Digital DVI(PC) “2” – BNC(PC) “3” – CVBS “4” – S_video
Select menu timeout	0x93, n I “+” I “-“ I “r” I “R” I “?”	Select menu timeout = Value / increment / decrement Reset Query	OSD menu timeout selected “0” – 20s “1” – 30s “2” – 50s “3” – 100s
OSD H position	0x90, nnn I “+” I “-“ I “r” I “R” I “?”	Set OSD H position Value / increment / decrement Reset Query	OSD Horizontal position
OSD H position	0x91, nnn I “+” I “-“ I “r” I “R” I “?”	Set OSD H position Value / increment / decrement Reset Query	OSD Horizontal position
Soft Power On / Off	0xc8 “0” I “1” I “?”	Soft power Off/on Query	“0” – soft power off “1” – soft power on
Query information status	0xc9	read the status of information	“0” – serial number “1” – s/w ver “2” – temperature value “3” – input satus “4” – communication “5” – backlight value
Query PCBA number	0xcb, “1”	Read PCBA number	“nnnn” = PCBA number
Factory Recall	0xce	Reset all parameters to default Value.	“1” – successful
Graphic horizontal Resolution enquiry	0xb7	Horizontal resolution (in pixels) In 3 digit hex number	“nnn” = Horizontal resolution
Graphic Vertical Resolution enquiry	0xb8	Vertical resolution (in lines) In 3 digit hex number	“nnn” = Vertical resolution
Graphic horizontal Sync frequency	0xb9	Horizontal Sync frequency (KHz) In 3 digit hex number	“nnn” = Horizontal Sync frequency

Graphic Vertical Sync frequency	0xba	Vertical Sync frequency (Hz) In 3 digit hex number	“nnn” = Vertical Sync frequency
Buzzer control- Volume adjust	0x80,”a” | ”A”, n | “+” | “ - ”| “r” | “R”| “?”	Set Buzzer Volume = Value/increment/decrement Rest Query	Buzzer Volume Control
Buzzer control- ON/OFF(mute)	0x80,”m” | ”M”, “0” | “1” | “r” | “R”| “?”	 Disable Buzzer Output Enable Buzzer Output Rest Query	“0” Buzzer OFF(mute) “1” Buzzer ON.

n = 1- byte ascii-coded hex number, e.g., parameter value of 0 x 1 is represented by “1”(0x31)
nn = 2 – byte ascii coded hex number, e.g., parameter value of 0 x 1e is represented by “1”,”e” l ”E” (0x31,0x6el0x4e)

3 User Controls

3.1 Operation



POWER ON AND OFF

Power ON: To turn the display on, press the soft-power switch. The LED indicator will turn green.
Power OFF: To turn the display off, press the soft power switch for 5 seconds. The LED indicator will be turned Amber color.

DISPLAY DIMMING CONTROLS

This TFT display features a fully dimmable image, which means it is capable of displaying a completely Black image when the Brightness Knob is turned fully to counter-clockwise.

LED INDICATOR DIMMING

The LED light intensity is adjusted with the backlight Knob.

HOT KEY

The user can assign various display function as hot keys

Hot Key1 is able to directly source change. Press the “SELECT”.
Hot Key2 is able to directly PIP. Press and hold the “◀” for 5seconds
Hot Key3 is able to directly auto adjustment in Analog. Press the “▶” for 5 seconds.
When auto adjustment is preformed on the special pattern, if it needs, firstly contact for us.
Hot Key4 is able to protect directly OSD. Press and hold the “MENU and SELECT” for 5 second simultaneously.

3.2 USER Control Access

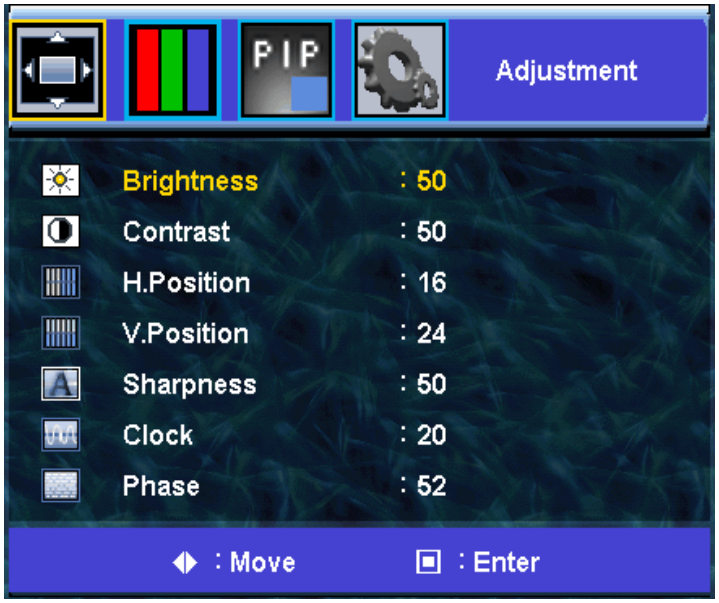
1: Press the ”MENU” button. The OSD menu will show all the available functions you can adjust or control.
2: You can move to the next icon by pressing “◀ and ▶”.
3: Select options within icon menu by pressing “SELECT” button. The select option will turn yellow.
4: Use “◀” or “▶” button to decrease/increase values.
5: Move the selection left or right by using “◀” or “▶” button. The selected option will turn blue bar.
6: You can exit the pressing “MENU”.

3.3 OSD(ON SCREEN DISPLAY) Navigation

The description below is how to operate the control functions via OSD. The following is the initial OSD menu displayed by pressing “MENU”. It looks like the general computer monitor, so it is more users friendly.

3.3.1 Adjustment

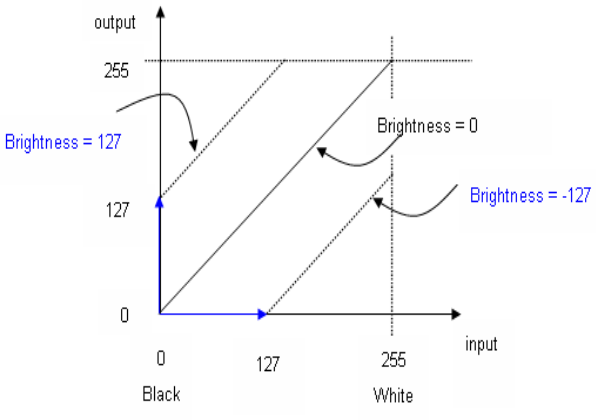
The “Adjustment” menu is for controlling the brightness, contrast, positions, sharpness, clock and phase.



3.3.1.1 BRIGHTNESS

The function is able the user to adjust brightness for the display, 50 is default value.

“Brightness” adjusts the light output by controlling the opening of Liquid Crystal, it is different from “Dim Brightness” which is adjusted by controlling the amount of light of backlight directly. But their effects are very similar. Its adjustment range is -127 to +127. The closer to -127 it is, the darker it is and the closer to +127 it is, the brighter it is. When one of the submenu of “Adjustment” is selected, the select button push to select it., so that adjusts the values of the brightness. When the menu button is pushed , going back to the upper menu.

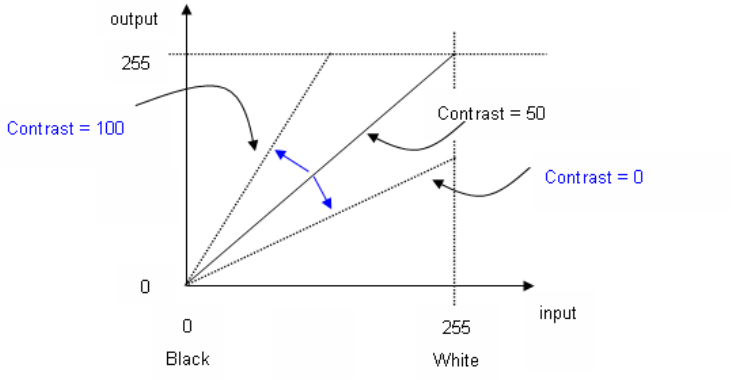


To adjust the brightness is to remap the input data to output data in terms of black and white level. It is to change the range of data, it means that if the brightness is 127, input data 0 - 255 is remapped to output data 127 – 255, so it looks like brighter. On the other way, if the input data is remapped to 0 – 127, it’ll be darker. It is to remap the data to LCD panel newly, but it is not to change the real input data. The brightness adjustment acts on the displayed image of all input data - R, G, and B by the same level.

3.3.1.2 CONTRAST

The function is able the user to adjust contrast for the display, 50 is default value.

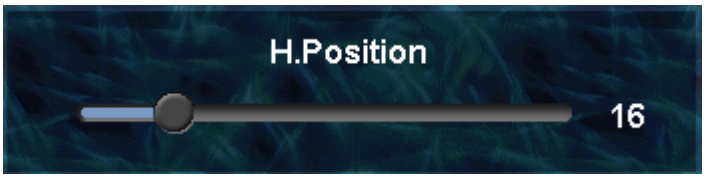
"Contrast" is the submenu of "Adjustment", which sets up the gain of output video signal to panel. Its adjustment range is 0 to +100. When one of the submenus of "Adjustment" selected, the select button push to select it. so that adjust the values of the Contrast. When the menu button pushed, going to the upper menu.



To adjust the contrast is to remap the input data to the output data in terms of white level only. It means that if the contrast is max. 100, input data over 127 is mapped to 255, so, the depth between black and white is expanded. On the other way, if it is min. 0, input data 0 – 255 is mapped to 0 – 127, so, the depth is reduced. The contrast adjustment acts on the displayed image of all input data - R, G, and B by the same level. And it also controls the data to panel, but it does not adjust the input

3.3.1.3 H.POSITION

The function is able the user to adjust horizontal position of image



"H-Position" is the submenu of "Adjustment", which controls the horizontal position of image, Its adjustment range is 0 to +100 and default is 50. When the H-position of the submenu of "Adjustment" is selected, the select button push to select it. so that adjust the values of the H-position. When the encoder switch pushed , going to the upper menu.
Adjusting the "H-position" shifts the horizontal position of image. If the value of "H-position" is increased or decreased by pressing "◀ and ▶", the "H-position" shifts to the right or to the left.

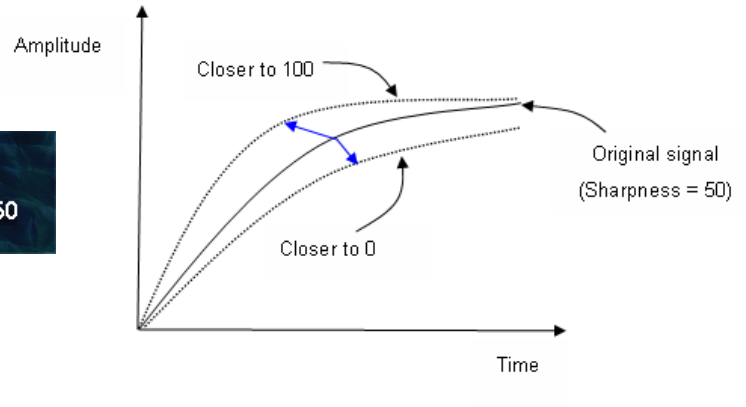
3.3.1.4 V.POSITION

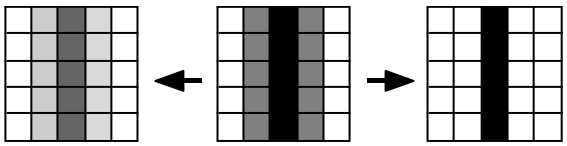
The function is able the user to adjust vertical position of the display.

"V-Position" is the submenu of "Adjustment", which controls the vertical position of image, Its adjustment range is 0 to +100 and default is 50. When the V-position of the submenu of "Analog adjustment" is selected, the select button push to select it. so that adjust the values of the V-position. When the encoder switch pushed , going to the upper menu.
Adjusting the V-position shifts the vertical position of image. If the value of "V-position" is increased or decreased by pressing "◄ and ►", the "V-position" shifts the upper or the lower.

3.3.1.5 SHARPNESS

The function is able the user to adjust sharpness for the display





"Sharpness" is for making a clear image. Its adjustment range is 0 to +100. When it is 100, the image is the most clear. When it is closer to 0, the image is blurred. This is not the absolute value on all signals. It may differ from every signal because the original source quality is very various. If the original signal is good quality, the image may be looked rather artificially than clearly in max. value 100. In this time, the value should be adjusted to lower value. If the original source is poor quality, the image becomes clearly more by adjusting closer to 100. The default value is 50.

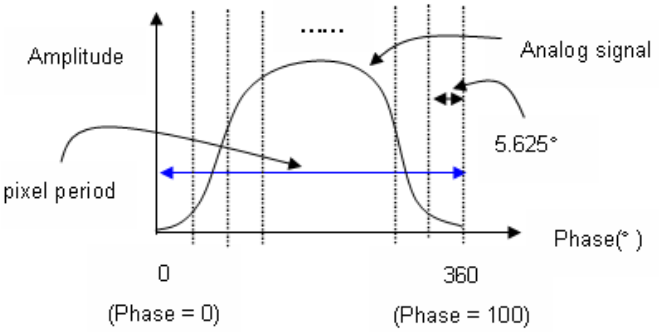
3.3.1.6 CLOCK

The function is able the user to adjust the number of sampling clock.

The “Clock” is the menu for the setting of the number of pixels corresponding to the pixel rate of the applied analog input signal. It represents the number of sampling clock during one period of horizontal sync signal.

3.3.1.7 PHASE

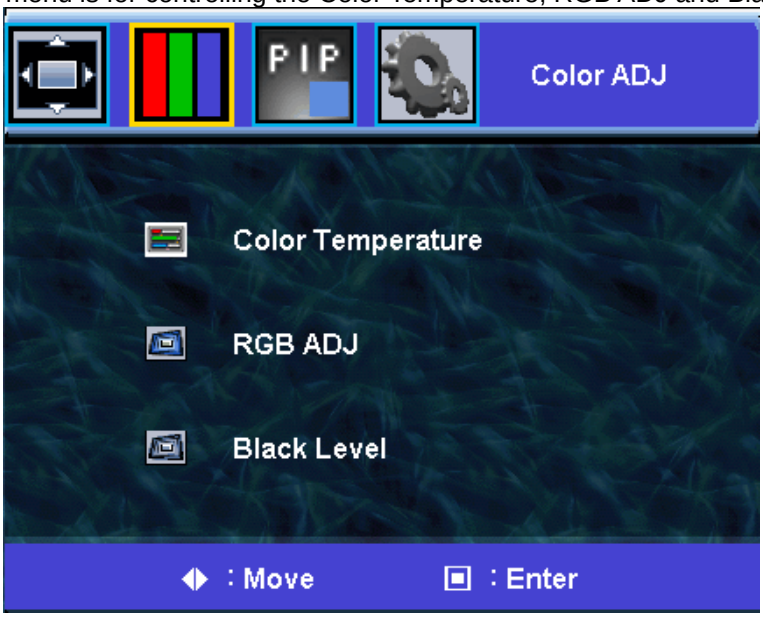
The function is able the user to adjust phase of sampling clock



Its range is 0˚ to 360˚, which is adjusted by 5.625˚ per one step and can be totally adjusted to 64 steps. This is not represented on OSD by a real phase value, but it is represented by 0 to 100 on OSD.

3.3.2 COLOR ADJ

The “COLORADJ” menu is for controlling the Color Temperature, RGB ADJ and Black.

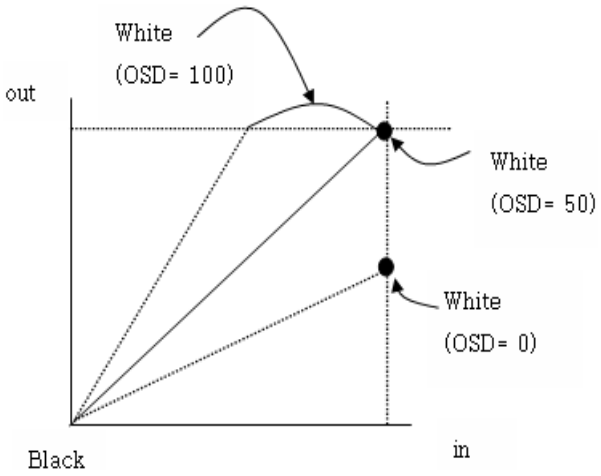


3.3.2.1 COLOR TEMPERATURE

The function is able the user to modify the color temperature of the picture for the Display.
Higher temperature : “cooler” picture. Lower temperature : “warmer” picture.
User can select one of 9200K, 6400K, 5600K and User color temperature measured
You can adjust color temperature via the User(RGB)

3.3.2.2 RGB ADJ

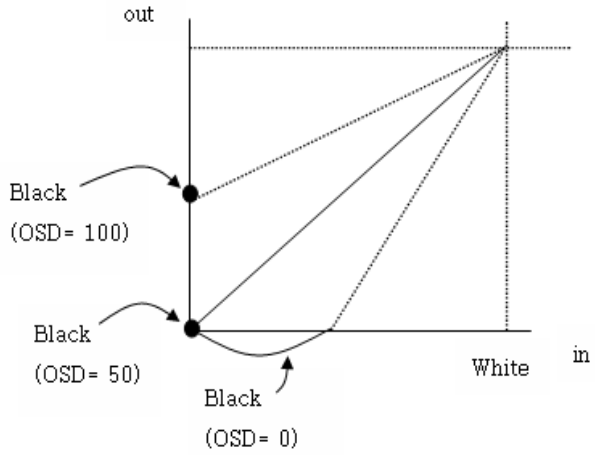
The function is able the user to adjust Red, Green and Blue offset for the display
These set up the gain of black level of input video signal to ADC amp (Analog to Digital Converter).
.



When all white levels are on the points of OSD 50, the amount of color is the same each other. But, if the level is moved closed to OSD 100, the amount of color to adjust is more, so, the color to adjust looks like strong. On the other way, if it goes to OSD 0, the amount of color to adjust is less, so, the color is felt weakly. If the color is changed in brighter level, adjust the white level. But it also effects on dark level.

3.3.2.3 BLACK LEVEL

The function is able the user to adjust Red, Green and Blue gain for the display
These set up the offset of video signal of ADC amp.



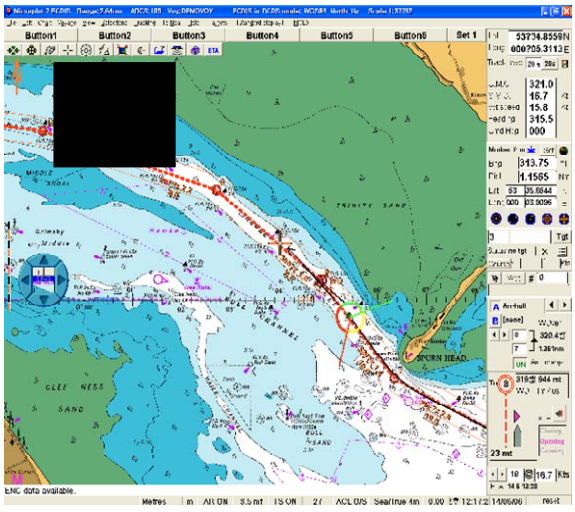
When all black levels are on the points of OSD 50, the amount of color is the same each other. But, if the level is moved closed to OSD 100, the amount of color to adjust is more, so, the color to adjust looks like strong. On the other way, if it goes to OSD 0, the amount of color to adjust is less, so, the color is felt weakly. If the color is changed in darker level, adjust the black level. But it also effects on bright level.

3.3.3 PIP(Picture In Picture)

This function is for displaying the video image window on the image from PC. CVBS or S-Video is possible to display on PIP window. The image from PC over DVI, BNC and D sub connector is unable to display on the window.

3.3.3.1 PIP ON/OFF

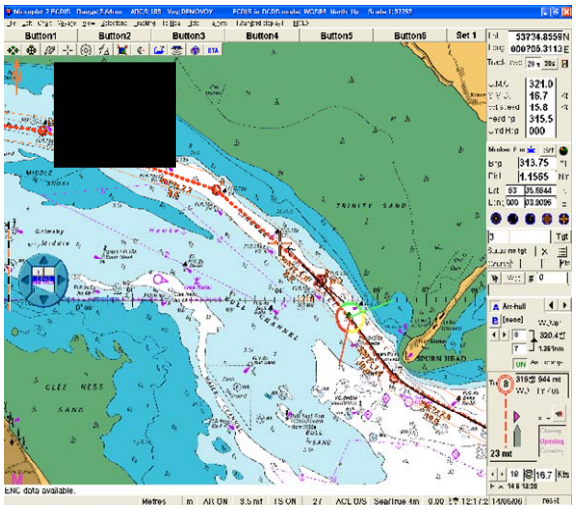
This function is able the user to configure PIP window ON/OFF



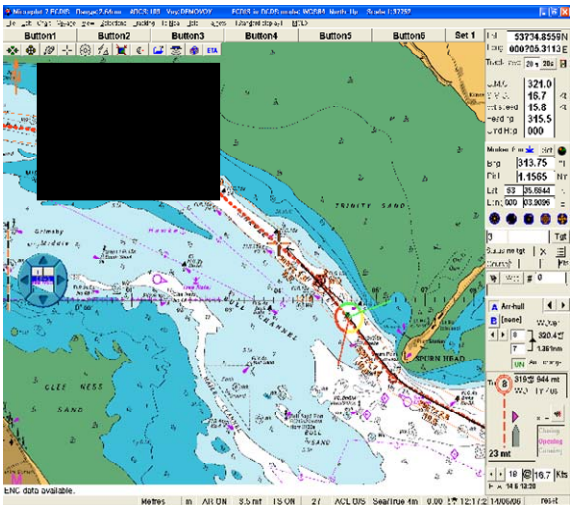
< PIP ON >

3.3.3.2 PIP SIZE

This function is able the user to configure PIP window size.



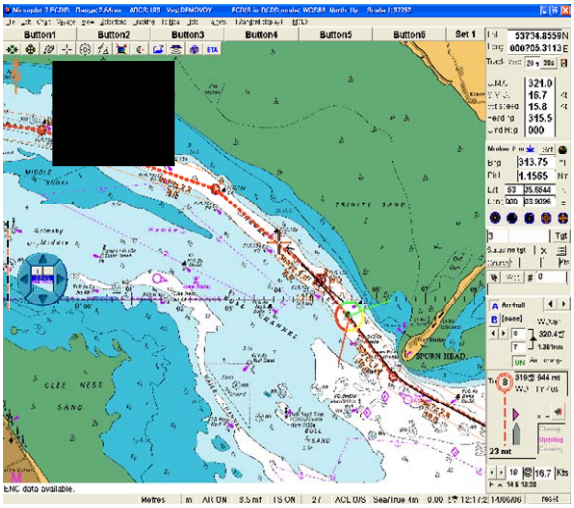
<PIP Size: Small>

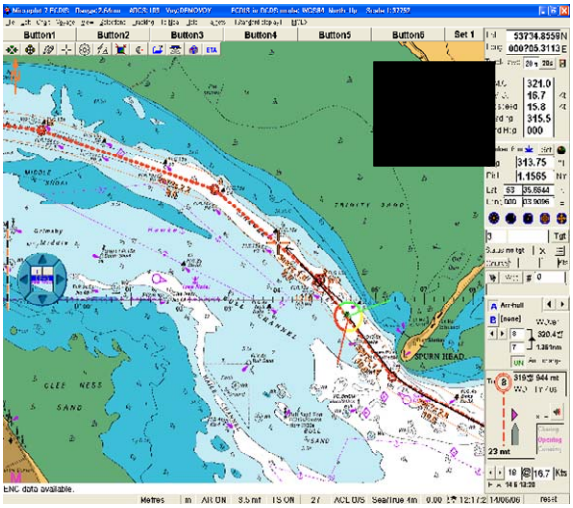


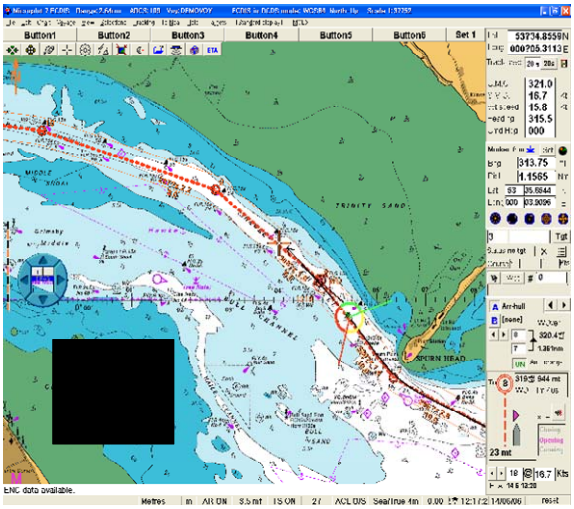
<PIP Size: Large>

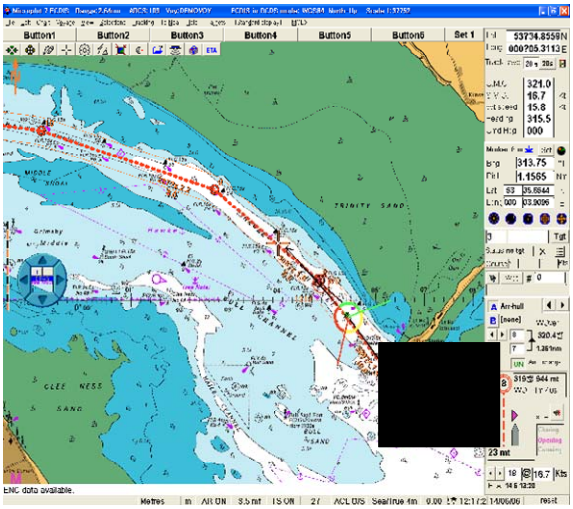
3.3.3.3 PIP LOCATE

The function is able the user to the configure PIP horizontal and vertical position


<Left Top>


<Right Top>


<Left Bottom>


<Right Bottom>

3.3.3.4 PIP SOURCE

The function is able the user to configure PIP input source.

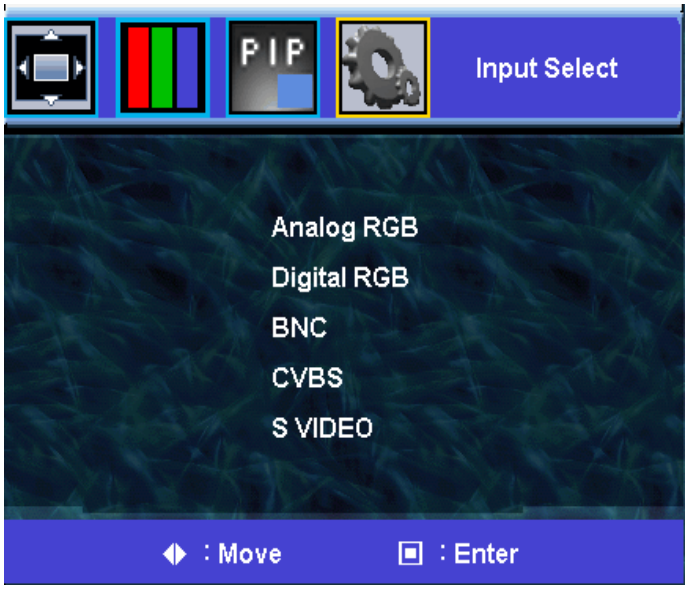
CVBS = manual select composite video signal only
SVIDEO = manual select S-Video signal only.

3.3.4 SETUP MENU

In this menu, user can set up the setting values.

3.3.4.1 INPUT SELECT

The function is able the user to select one of Analog RGB(D-sub), Digital RGB, BNC,CVBS and S-Video



3.3.4.2 COMMUNICATION

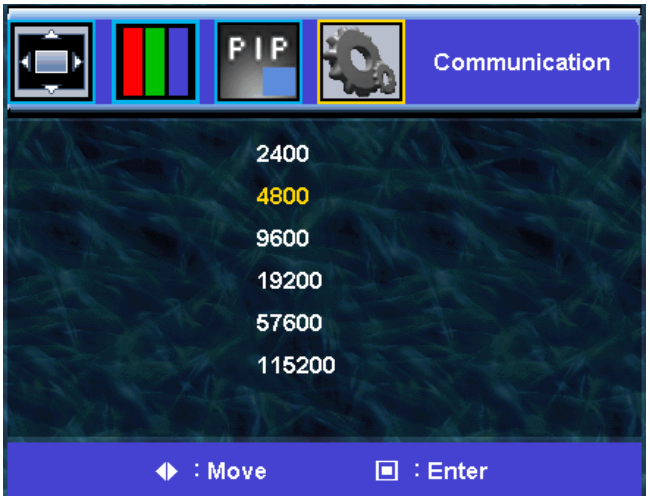
“Communication” represents the communication setting between monitors or between the control system and the monitor

3.3.4.2.1 ID

This assigns the monitor's number, range Zero to fifteen, in order to identify the monitors, and it must be unique for distinguishing from each other. And, In the case of chaining several monitors thru communication port, the ID of monitor to be connected with control system must by Zero.

3.3.4.2.2 BAUD RATE

"Baud Rate" is the submenu of "Set-Up" which assigns a communication rate, 1200, 2400, 4800, 9600, 57600, and 115200 baud rate, that the system can support.

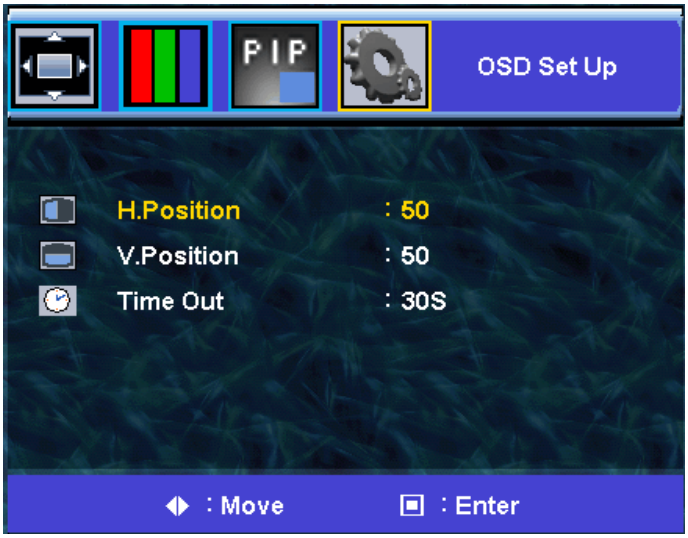


3.3.4.2.3 Communication

This assigns the communication mode. The monitor connecting with the control system is assigned the RS232 or RS422 and it connecting with other monitor is assigned to the RS485. So, one of three must be chosen as input communication mode.

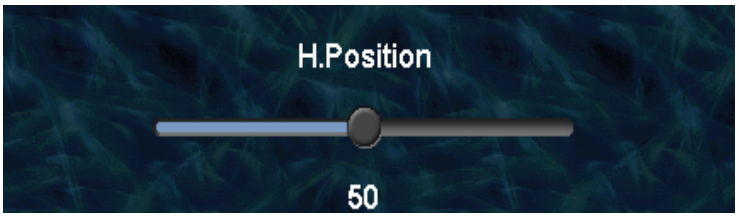
3.3.4.3 OSD SETUP

“OSD Set Up” is the submenu of “Set-Up” which sets up the position of OSD, and OSD Timeout.



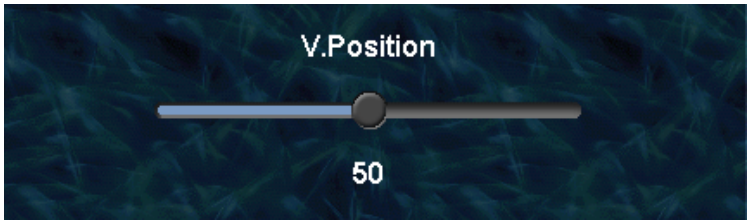
3.3.4.3.1 H.Position

This function is able to adjust the horizontal position of OSD.



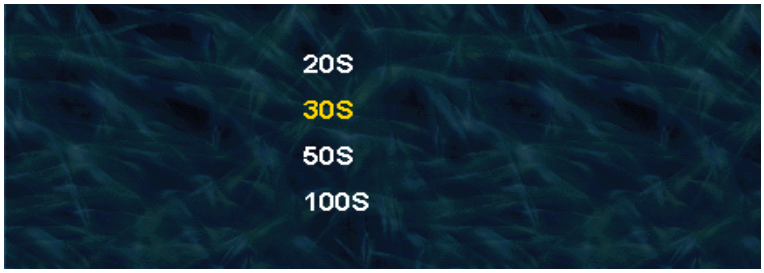
3.3.4.3.2 V.Position

This function is able to adjust the vertical position of OSD.



3.3.4.3.3 TIME OUT

"OSD Timeout" is the submenu of "OSD Set Up", which controls the time to display the OSD menu 20, 30, 50, and 100 : When the user don't touch anything, the OSD menu is disappeared after 20, 30, 50 or 100 seconds, which keeps display OSD.



3.3.4.3.4 Language

This function is able to choose the OSD language, one of English or Korean.

3.3.4.4 Buzzer Set Up.

This function is available to the buzzer model only
This function is buzzer on/off and adjusts volume controls.

3.3.4.4.1 On/Off

Buzzer On/Off control

3.3.4.4.2 Volume

The sound adjust the ‘low, middle and high’

3.3.4.5 FACTORY RECALL

"Factory Recall" is the menu for restoring to the factory setting values. The settings with which the display leaves factory are stored in a factory settings storage area on main control board. And the current settings are stored in a user settings storage area on main control board. At administrator level, the current settings are replaced by the factory settings. The user settings disappear after changing by the factory settings.

3.3.4.6 INFOMATION

This function describes the Serial Number, S/W version, Temperature, input source, communication Mode and the light of Backlight.

3.3.4.6.1 Serial NO.

"Serial No." describes the serial number of monitor. The serial number is unique on every monitor.

3.3.4.6.2 SW ver.
"S/W ver." describes the version of software installed on monitor.

3.3.4.6.3 Temp.
"Temp. Status" describes the current internal temperature status or the information of the warning level (65℃), the critical Value (80℃) and the safe level (64℃). See 1.1.6.4.

3.3.4.6.4 Input
A signal to display now on screen is described.

3.3.4.6.5 Comm.
"Comm." represents a communication mode.

3.3.4.6.6 Backlight
"Backlight" represents the light of backlight.